are catalogued in identical positions, but he finds they are distinct stars, and the companion to Σ 410 is of 19 mag. of Herschel's scale. The companion of Σ 2749 shows an increase in distance and angle; the three stars are now almost in a line. The position of Σ 388 appears to have increased 100° since 1835.—J. Pebbutt gives position observations of Coggia's Comet, together with comparison stars. J. C. Watson sends a note on his discovery of Planet (139) at Pekin.—The elements and an ephemeris of Borrelli's Comet of December 1874 are given by J. Holetschek.

COMET 1874, VI.

T = Oct. 18.7391 Berlin time.
π = 298° 46′ 38″
Ω = 281° 38′ 18″
i = 99° 25′ 43″
log. q = 9.71576.

—Burnham notes the discovery of a close companion to β Leporis, dist. 2″, pos. 269°·1, 10th mag. This appears to have been missed by Herschel.—Prof. Bredichin gives differential measures of position of Juno and adjacent stars.—A number of position observations of the minor planets are given by Kowalczyk.—A lithograph of various appearances of Coggia's Comet, drawn by Vogel, accompanies this number.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, Feb. 11.—"Some particulars of the Transit of Venus across the Sun, December 9, 1874, observed on the Himalaya Mountains, Mussoorie, at Marz-Villa Station, lat. 30° 28′ N., long. 78° 3′ E. Height above sea, 6,500 feet."—Note No. I. By J. H. N. Hennessey, F.R.A.S. Communicated by Prof. Stokes, D.C.L., Sec. R.S.

The author observed the event with the equatoreal of the Royal Society, which Capt. J. Herschel, R.E., in his absence from India, had temporarily placed at his disposal. His especial object in view was to observe the transit from *a considerable height*, and this condition was easily secured through the circumstance that he was located only fourteen miles from Mussoorie, on the Himalaya Mountains. His numerical results will be communicated very shortly in a second note. The remarks here made are restricted chiefly to what he *saw* with the equatoreal.

The telescope of the equatoreal has a 5-inch object-glass, with about sixty inches focal length, and is driven by an excellent clock.

The author found from actual trial that the most suitable eye-piece for both ingress (sun's altitude 2° 24′ to 7° 29′) and egress (sun's altitude about 26°) was one of 125 power. He selected for ingress two glasses which, combined, gave a neutral or bluish field; and for egress he changed one of these for a deep-red glass, so that the field now presented a moderately deep red. The glasses were quite flat, and lay against one another in intimate contact, giving excellent definition. He enjoyed most exquisitely clear weather during his observations.

In describing the phenomena of the transit, the author has occasion to speak of Venus as she appeared *across* the sun's limb, when one portion of her own limb is seen against the sun, and the other remains against the sky. The former portion he calls Venus's sun-limb, or V_n, the latter Venus's sky-limb, or V_k. Again, he requires to mention a ring of light around V_k, which he indicates by L_k, the corresponding ring around V_n being understood by L_n. Another point is this: anyone who has watched, say the sun's limb, especially at a low altitude and with high power, must be aware of the turmoil or ebullition which there appears, very like as if the limb was being boiled. He denotes this kind of turmoil by "boiling."

The author did not detect Venus's limb until after it had made an indentation on the sun's limb. The latter boiled sensibly, but by no means violently. It appeared jagged, and as if with minute spikes projecting inwards, all of which were well defined in the bluish field. Watching V_n, he found it also boiling slightly, but in a manner somewhat different to the sun's limb. The appearance was that of boiling vapour coming round from the face of Venus, turned towards the sun and overlapping V_n; moreover, this boiling was not restricted to the edge of V_n, but extended 2″ or 3″ beyond, thus forming a kind of boiling annulus, in which there were minute sparkling specks dancing and shifting about, appearing and disappearing; the edge V_n was seen through the boiling.

Neither pear-drop nor ligament was seen either at ingress or egress.

Col. Walker, who was at Dehra Doon, in the valley below, some ten miles south of Mr. Hennessey's position, writing to the author, states that he "saw the pear-drop and the ligament very distinctly."

After describing his own observations, the author concludes as follows:—

1. In view of the light-ring L_k, and of the peculiar boiling annulus around V_n, which may be called L_n, I have no doubt that L_n was, in fact, a continuation of the light-ring L_k, *which latter, beyond all question, was plainly visible;* and under these circumstances it may be urged that Venus is surrounded by an atmosphere which at the time was made *visible* to the extent of 2″ to under 4″ in breadth.

2. As a matter of fact, the pear-drop or other ligament was visible at a height of 2,200 feet, but at 6,500 feet the ligament was invisible. The influence generally of height of station, from this evidence, appears undeniable; but the phenomenon still remains to be accounted for definitely. If, however, an effective atmosphere of x breadth around Venus be conceded, this atmosphere may be supposed to stop a certain amount of direct light from the sun, producing a slight shade around Venus corresponding to the breadth x. This shade would, I conceive, be quite invisible when its outer edge is backed by the sun's bright light; but could we contract the sun to a diameter equal to that of Venus *plus* twice x, and make Venus and the sun concentric, it appears likely that we should see a shaded annulus right round Venus between her limb and that of the sun. Further, that the annulus would appear darker at low than at higher altitudes, and would become invisible when the observer was raised above a sufficiency of the earth's atmosphere. Should these suggestions prove tenable, the ligament seen would break when the outer edge of the shade, corresponding to x, transited across the sun's limb.

3. Solar light shining through Venus's atmosphere, if any, produces no alteration in the lines of the solar spectrum, so far as the dispersion of a single simple prism can show. Also, Venus's face, turned towards us, reflects no light during transit, subject to the same instrumental test.

"Appendix to Note, dated November 1873, on White Lines in the Solar Spectrum," by J. H. N. Hennessey, F.R.A.S. Communicated by Prof. Stokes, Sec.R.S.

After detection of the white lines 1650 and 1658 (Kirchhoff's scale) at Mussoorie in November 1873, I discovered two other such lines before leaving that station of observation, viz. 2009 and 2068 (about). On 28th November, 1873, I packed up the spectroscope, taking particular care that the prisms should not shift from the position they then occupied.

On 28th November, 1873, I set up the spectroscope in the Dome Observatory at Dehra, in the valley below, the prisms retaining their former position, and my recollection of the white lines seen at Mussoorie being still quite vivid. I now found that 1650 and 1658 were distinctly seen; but they were no longer nearly of the pure white colour they presented at the higher station, while what may be termed the gloss about their whiteness, which induced me to describe them as resembling "threads of white silk held in the light," had quite disappeared; indeed they were now so decidedly greenish as not to invite attention. White line 2068 I now could hardly see, and 2009 was invisible, notwithstanding that I was quite familiar with the positions they occupied, and had made careful notes on the subject.

After this I released the prisms and turned them about variously, without producing any alteration in the white lines as they were now seen.

The height of the spectroscope above sea-level was—

At Mussoorie	...	...	...	...	7100 feet.
,, Dehra	...	...	...	...	2200 ,,

Anthropological Institute, Feb. 9.—Col. A. Lane Fox, F.S.A., president, in the chair.—The President exhibited a series of stone implements from the Alderley mines of Cheshire, and Dr. J. Simms exhibited five Lapp skulls.—A paper by the Rev. Wentworth Webster was read on the Basque and the Kelt, an examination of a paper by Mr. Boyd Dawkins, F.R.S., on the northern range of the Basques, in the *Fortnightly Review* of

September 1874. The author commenced by pointing out the danger of the tendency to extreme specialisation among scientific men of the present day, and proceeded to show how the "Basque problem" had suffered through that treatment. It had been taken up by pure philologists and pure anthropologists, who had viewed it only from their particular standpoints, and had too much neglected historical and archæological researches, folk-lore, literature, drama, and, strangest of all, the physical characteristics of the present Basques. The chief aim of the paper was to show how inconclusive was the evidence of anthropology alone, and to examine Mr. Dawkins' arguments. It held that, firstly, philology had demonstrated the Basque language to be agglutinative; secondly, that W. von Humboldt's conclusion is correct as to the existence of Basque names in the classical geographies and itineraries of Spain; and, thirdly, that although the identity of Basque and Iberian cannot be considered as perfectly demonstrated, its probability is very high. The special point of dispute was the conclusion of Mr. Dawkins that "the former presence of an Iberian race in Armorica is demonstrated by Dr. Broca's map of the stature and complexion of the peoples of France." The author at great length examined and analysed the maps referred to and the statistics cited in the paper, and found that the evidence from anthropology alone did not seem sufficient to support the theory combated, and all other evidence would appear to be opposed to it.—Prof. Boyd Dawkins having replied to the Rev. W. Webster's criticisms, which, in the main, appeared to him to be founded upon a misapprehension of his use of the term "Iberian," Prince L. Lucien Bonaparte remarked that the paper offered scarcely any point in which he could not cordially concur, especially where the author referred to the high competency of W. von Humboldt in respect to the Basque language and ethnology; in fact, it was impossible to dispute the superiority of that eminent philologist on that special question over every modern author not by birth a Basque. He (the Prince) maintained that it would be as presumptuous to affirm that language is always a test of race as it would be, at least, hazardous to declare that anthropologists should invariably dispense with such a test. If an unimportant minority of philologists pretend to dominate over the anthropologists, they are wrong; but the minority of anthropologists, who maintain that language should not be considered in the determination of race, are still more in error.—Rev. A. H. Sayce, as a philologist, maintained that language could not be held to be a test of race; it was a test only of social contact.—Mr. Hyde Clarke vindicated the claims of philology as a branch of anthropology and of natural science. He thought the Basque area of W. von Humboldt should be much limited. The Basque had affinities with Houssa, and was thus connected with dark populations.—Mr. W. J. Van Eys remarked that Humboldt had not proved the Basques to be Iberian.—Prof. Busk, Mr. J. Rhys, Prof. Hughes, Dr. Simms, and Dr. Beddoe, also contributed to the discussion.

Geologists' Association, Feb. 5.—W. Carruthers, F.R.S., president, in the chair.—On the volcanic geology of Iceland, by W. L. Watts. Iceland is situated at the termination of the great volcanic line, skirting the extreme west of the Old World, which has existed since the Cretaceous period certainly, whilst the points of eruption appear to have travelled northwards. As all the rocks are igneous, or igneous derivatives, no stratigraphical arrangement can be made out. Basaltic lava streams are common in the vicinity of Reykjavik, though no active volcano exists in this part of the island, which is in the secondary stage of solfataras and hot springs. These solfataras are mere pits of bluish white siliceous mud, the result of the decomposition of contiguous tufa. The principal gas exhaled is sulphuretted hydrogen. Their position changes. The hot springs are working out their own destruction by the accumulation of sinter; the composition of this varies in springs within a few yards of each other. The large rifts in the old lava at Thingvalla were attributed to the flowing away of the undercurrent of lava into a yet deeper depression, thus leaving the unsupported crust to sink down in the middle. All the lavas of Hekla observed by the author are basaltic, and contain crystals of felspar and olivine. An ash and cinder cone forms the summit of the mountain. There were four craters; the longest one is an elliptical depression 250 feet deep, at the bottom of which lay snow, though some ashes and clay were still quite hot. The district of Mydals Jokull, containing the terrible volcano Kotlujia, is remarkable for the confused intermixture of aqueous and igneous ejectamenta, producing agglomerates and tufas. Sand and hot water are the principal productions of Kotlujia itself, which has not been known to produce lava, though ancient felsitic lavas were noted at its base. These floods are produced, in addition to the melting of the Jokull, by the bursting of large cavities in which water has accumulated for years. Such a reservoir was noted in a small neighbouring crater, at the bottom of which was a deep pool of turbid water, into which several small streams emptied themselves, but none ran out again. To Vatna Jokull the principal volcanic forces of Iceland seem now to have retreated. This is a vast tract of snow and ice which rests upon a nest of volcanoes, many of which have been in eruption during historical times. The Vatna rises from a series of basaltic platforms. The existence of permanently active volcanoes in the unknown interior of this mass was considered not improbable.

Edinburgh

Royal Society, Feb. 15.—Sir William Thomson, president, in the chair.—The following communications were read:—Obituary notice of Dr. Robert Edward Grant, late Professor of Comparative Anatomy in University College, London, by Dr. Sharpey.—An illustration of the relative rates of diffusion of salts in solution, by Prof. Crum Brown.—On the oscillation of a system of bodies with rotating portions, by Sir Wm. Thomson.—Laboratory notes, by Prof. Tait.

Meteorological Society, Feb. 10.—This was the half-yearly meeting of the Society. Mr. Milne Holme presided.—The Chairman read the report of the Council, of which the following is a summary:—The number of the Society's stations in Scotland was at present 92, and there were also 11 in other countries. The number of members was 538 ordinary, 15 corresponding, and 8 honorary members. After referring to the inquiry conducted by Dr. Arthur Mitchell and Mr. Buchan on the influence of the weather on mortality and disease, the report noticed that, on the suggestion of Mr. Thomas Stevenson, C.E., schedules had been supplied to the observatories within twenty or thirty miles of Edinburgh, so as to secure data for investigating the relation of the force of the wind to the barometric gradient. Returns had been received, but these had not yet been examined. Meteorological returns applicable to Loch Fyne for the last twenty years had been furnished by Mr. Buchan on application to the Special Commissioners appointed to inquire into the causes of the disappearance of herrings from Loch Fyne. The investigations regarding the herring fisheries on the Scottish coasts, instituted by the Society, had been continued during the past session. The Marquis of Tweeddale, who originally suggested the inquiry, had supplied the Society with twenty thermometers, to be used to ascertain the temperature of the sea at the places and at the times when the fishery was being carried on. These thermometers were by Mr. Bouverie Primrose sent to the fishery officers of the Herring Board stationed along the east coast of Scotland, and each fishery officer selected an intelligent fisherman to take the temperature of the sea where the herring shoals were found. Important results were expected from these investigations.—Dr. Arthur Mitchell read a paper on the effects of the weather of the last three months on the death-rate.—Mr. Buchan read a paper on the bearing of meteorological records on the supposed change of climate in Scotland. Mr. Buchan concludes that there has been no general tendency towards a permanent change, either as regards summer heat or winter cold.

Manchester

Literary and Philosophical Society, Jan. 26.—Edward Schunk, F.R.S., &c., president, in the chair.—A descent into Elden Hole, Derbyshire, by Rooke Pennington, LL.B. Near the road from Buxton to Castleton, and about four miles from the latter place, stands Elden Hill, in the side of which is Elden Hole, a perpendicular chasm in the rock, and, like many such apertures, reputed to be bottomless. The author describes a descent into the cavern, made by himself and others, on the 11th of September, 1873. At a distance of 180 ft. from the top a landing-place was reached, although not a very secure one, as it was inclined at an angle of about 45°. Thence a cavern ran downwards towards the south or south-east; the floor was entirely covered with loose fragments of limestone, probably extending to a considerable thickness. There was quite sufficient light at this point to enable one to sketch or read. The party then scrambled, or rather slipped, into the cavern for some few yards, during which they descended a considerable distance: it was of a tunnel-like shape; then it suddenly expanded into a magnificent hall about 100 ft. across and about 70 ft. high. The floor of this half

sloped like the tunnel, and like it was covered with *débris*. At the lower side they were about 60 ft. below their landing-place, and therefore about 240 ft. beneath the surface. The entire roof and walls of this cavern were covered with splendid stalagmitic deposits. From the roof were hung fine stalactites, whilst the sides were covered with almost every conceivable form of deposited carbonate of lime. In some places it was smooth and white as marble, in other places like frosted silver, whilst the rougher portions of the rock were clothed with all sorts of fantastic shapes glistening with moisture. From this cavern no opening of any length or depth was found save the one by which the party had entered it. There can be no doubt, the author believes, that this chasm has been formed by the chemical action of carbonic acid in water, and that it has attacked this particular spot either from the unusual softness of the rock originally situated here, or because there was here a joint or shrinkage in the strata. There is nothing, however, in the position of Elden Hole to lead one to suppose that any stream has ever flowed through it; no signs of such a state of things appear anywhere around. It is not related to any valley or ravine, or to any running water, and there is, as observed, an absence of any well-defined exit for water at the bottom. No mechanical action of a flowing stream can therefore have assisted the process of enlargement. The author thinks it must be due to the gradual silent solvent properties of rain-water falling on the surface, and escaping through jointings and insignificant channels in the hard rocks below. Whether the excavation took place from above or below is uncertain.—Certain lines observed in snow crystals, by Arthur W. Waters, F.G.S.

GLASGOW

Geological Society, Jan. 14.—Mr. John Young, F.G.S., vice-president, in the chair.—Mr. D. Bell read a paper on the geology of Switzerland, embodying some observations made during a recent visit to that country.

Philosophical Society, Dec. 2.—Physical Section.—The following papers were read:—On the absence of air and water from the moon, by Mr. Francis Napier.—Experiments on fluid jets and induced currents, by Mr. Alex. Morton.

Dec. 16.—On an apparatus for testing the lubricating powers of various liquids, showing some hitherto unrecognised facts at variance with the commonly received laws of friction, by Mr. R. D. Napier.—On the effect of Loch Katrine water on various metals, by Mr. Jas. R. Napier, F.R.S.

PARIS

Academy of Sciences, Feb. 8.—M. M. Frémy in the chair.—The following papers were read:—A remark by M. Puiseux on M. Genocchi's paper read at the last meeting with regard to the existence of the integral in equations with partial derivatives.—A letter from M. Janssen, dated Kompira-Yama (Japan), Dec. 10, 1874, describing the general results of the observations of the Transit of Venus. The first part of the letter shows that the party of observers suffered much from bad weather during their installation at Kompira-Yama, near Nagasaki. During a heavy gale one of the equatorials was completely destroyed, the telescope and micrometer broken, but their outfit was excellent, and before the day of the transit arrived they were able to repair all the damage done. Both the first outer and inner contacts, as well as the second inner one, were successfully observed, and only the last outer one missed through clouds. No black drop appeared at the sun's limb, although M. Janssen remarks that a considerable time elapsed between the moment when the first inner contact appeared geometrically perfect and the re-appearance of a fine line of sunlight beyond the disc of Venus; this M. Janssen ascribes to the planet's atmosphere.—On the general theorems of the displacement of a plane figure on its plane, by M. Chasles.—A note, accompanied by the presentation of an autograph mathematical treatise, by M. Faye.—On the magnetisation of steel rods provided with armatures, by M. J. Jamin.—A note by M. Chevreul on M. Menier's paper, read at the last meeting, on the pulverisation of manures and the best means to increase the fertility of soils.—A memoir by M. Des Cloiseaux, on the bi-refractive and characteristic optical properties of the four principal triclinic felspars, and a process to distinguish them immediately from each other; four felspars the author treats of are albite, oligoclase, labradorite, and anorthite.—On an easy method to determine the latitude of a place without instruments and with sufficient correctness, by M. d'Avout; the method is based on the observations of the shadows of two points situated in a vertical at known distances, projected upon a horizontal plane, the observations being made both before and after the sun's passage through the meridian.—On the fertilisation of Basidiomycetes, by M. P. van Tieghem.—A note on M. Mendeleef's new balance, by M. Salleron.—On rolling-curves obtained by photography, by M. Huet; an ingenious process to note down permanently the curves described by ships rolling in heavy seas.—On a new electro-magnet, formed by concentric tubes separated by layers of conducting wire, by M. J. Camacho.—On the place to be given to Gymnosperms in natural classification, by M. L. Lerolle.—Several communications on Phylloxera, by MM. Lichtenstein, Boutin, Hemmerich, and others.—A note by M. C. Guérin, on an electric pile similar to Bunsen's, but in which zinc would be replaced by iron.—A note by M. G. Peyras, on the use of fumigations to combat murrains.—A letter from M. Fua, with reference to his former communications on the means to prevent explosions in coal-pits.—A note by M. Houzé de l'Aulnoit, on articular immobilisation applied to the dressings of the amputated.—MM. Henry and Baillaud communicated their observations of planet (141), made at the Paris Observatory.—On the existence of integrals of any system of differential equations, by M. C. Méray.—A note on his paper, read at the last meeting, on the molecular equilibrium of a solution of chrome alum, by M. Lecoq de Boisbaudran.—On the action of hydrate of baryta upon certain mineral and organic compounds contained in beet-products, by M. P. Lagrange.—On so-called *rooty* beetroot, by M. C. Violette.—On the peripherical nervous system of marine Nematoidea, by M. A. Villot.—An account of experiments made by M. Philipeau, showing that the paps extirpated from young pigs will not regenerate.—General Morin presented to the Academy a new part of the *Revue d'Artillerie*, published by order of the War Minister, and made some remarks on the contents.

BOOKS AND PAMPHLETS RECEIVED

BRITISH.—Marsden's Numismata Orientalia: E. Thomas, F.R.S. (Trübner).—Anleitung zu Wissenschaftlichen Beobachtungen auf Reisen: Dr. G. Neumayer (Trübner).—Number; a Link between Divine Intelligence and Human: Charles Girdlestone, M.A. (Longmans).—Weinhold's Introduction to Experimental Physics. Translated and edited by Benj. Loewy, F.R.S. (Longmans).—Heredity and Hybridism: Edward W. Cox, S.L. (Longmans).—The Cone and its Sections treated Geometrically: S. A. Renshaw (Hamilton, Adams, and Co.)—Statistical Society Almanack for 1875 (E. Stanford).—Animal Physiology; the Structure and Functions of the Human Body: John Cleland, M.D., F.R.S. (Wm. Collins).—Physical Geography: John Young, M.D., L.R.C.S. (Edin.), F.G.S., F.R.S.E (Wm. Collins).—Proceedings of the Literary and Philosophical Society of Liverpool.—Six Months among the Palm Groves, Coral Reefs, and Volcanoes of the Sandwich Islands: Isabella L. Bird (Murray).—Humboldt's Natur-und Reisebilder: C. A. Buchheim, Ph.D., F.C.P. (F. Norgate).—An Introduction to Human Anatomy, including the Anatomy of the Tissues: Wm. Turner, M.B. (A. and C. Black).—Lessons in Elementary Mechanics: Philip Magnus, B.Sc., B.A. (Longmans).—Fungi: their Nature, Influence, and Uses: M. C. Cooke, M.A., LL.D. Edited by the Rev. M. J. Berkeley, M.A., F.L.S. (Henry S. King and Co.)

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